



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**CHEMISTRY**

**0620/32**

Paper 3 Theory (Core)

**May/June 2016**

MARK SCHEME

Maximum Mark: 80

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**Published**

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)(i)	B and D;	<b>1</b>
1(a)(ii)	C; has only one type of atom;	<b>2</b> 1 1
1(a)(iii)	Na <sub>3</sub> P;	<b>1</b>
1(b)(i)	16;	<b>1</b>
1(b)(ii)	5;	<b>1</b>
1(b)(iii)	60;	<b>1</b>
1(c)	acidic; because phosphorus is a non-metal/it is a non-metal oxide/it would react with bases/neutralises bases/ phosphorus is on the right-hand side of the Periodic Table;	<b>2</b> 1 1

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(a)	lead < nickel < zinc < titanium; (1 mark if one pair reversed)	<b>2</b>
2(b)	positive electrode: oxygen / O <sub>2</sub> ; negative electrode: aluminium / Al;	1 1 <b>2</b>
2(c)	test: (aqueous) sodium hydroxide / (aqueous) ammonia; result: (grey-) green precipitate / solid;	1 1 <b>2</b>
2(d)(i)	oxygen / air; water;	1 1 <b>2</b>
2(d)(ii)	idea of covering surface with tin / zinc / other suitable metal / plastic / grease / oil / paint / galvanising; prevents oxygen / air or water / moisture / steam from getting to the surface;	1 1 <b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3(a)	reversible reaction / equilibrium;	<b>1</b>
3(b)	exothermic <b>and</b> products have less energy than reactants;	<b>1</b>
3(c)(i)	percentage yield decreases as temperature increases;	<b>1</b>
3(c)(ii)	91%;	<b>1</b>
3(d)	test: (acidified) potassium manganate(VII)/potassium permanganate; result: (pink solution) turns colourless;	<b>2</b> 1 1
3(e)	any suitable use, e.g. food preservation / manufacture of sulfuric acid;	<b>1</b>
3(f)	sulfur dioxide; (sulfur dioxide) loses oxygen;	<b>2</b> 1 1
3(g)	3 (H <sub>2</sub> O);	<b>1</b>

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Question	Answer	Marks
4(a)	any 2 from: <ul style="list-style-type: none"> <li>family/group of similar chemicals;</li> <li>with same functional group;</li> <li>trend in physical properties;</li> <li>same general formula;</li> <li>same/similar chemical reaction;</li> <li>successive members differ by CH<sub>2</sub>;</li> </ul>	2
4(b)(i)	F and G; contain <u>only</u> carbon and hydrogen; have <u>only</u> single bonds/no double bonds;	3 1 1 1
4(b)(ii)	F / methane / CH <sub>4</sub> ;	1
4(b)(iii)	H; J;	2 1 1
4(b)(iv)	contain oxygen;	1
4(c)(i)	ethanol;	1
4(c)(ii)	yes <b>and</b> because there is a general increase in the numbers/the numbers go up steadily; <b>OR</b> no <b>and</b> because the numbers go down then up again;	1
4(c)(iii)	65°C;	1
4(d)(i)	2 (CO); 3 (H <sub>2</sub> O);	2 1 1
4(d)(ii)	poisonous / toxic;	1

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(a)	liquid; 6°C is higher than the melting point and lower than the boiling point/6°C is between the melting point and boiling point;	2 1 1
5(b)(i)	potassium chloride; iodine;	2 1 1
5(b)(ii)	<u>iodine</u> is less reactive than <u>bromine</u> / <u>bromine</u> is more reactive than <u>iodine</u> ;	1
5(c)	357 (1 mark for 1 correct row, e.g. (4 × 16 =) 64 or (2 × 35.5) = 71)	2
5(d)(i)	cross shown on baseline;	1
5(d)(ii)	ethanol / other organic solvent;	1
5(d)(iii)	dyes <u>move up</u> the paper and <u>separate</u> ;	1

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(a)	any 5 from: <ul style="list-style-type: none"> <li>• conducts electricity / conducts heat;</li> <li>• soft;</li> <li>• solid;</li> <li>• shiny (when cut);</li> <li>• malleable / ductile;</li> <li>• reacts with water to produce hydrogen;</li> <li>• bubbles / fizzes in water;</li> <li>• vigorous reaction with water;</li> <li>• floats on water / low density;</li> <li>• forms an alkaline solution with water;</li> <li>• reacts with oxygen / air to form an oxide;</li> <li>• reacts with chlorine to form a chloride;</li> <li>• suitable word equations (maximum two equations);</li> </ul>	<b>5</b>
6(b)	test: put the sodium compound on <u>nichrome</u> / <u>platinum wire</u> (on the edge of a blue Bunsen burner flame); result: flame goes yellow;	<b>2</b> 1 1
6(c)(i)	pH 13;	<b>1</b>
6(c)(ii)	add (red) litmus to sodium hydroxide / dip (red) litmus into sodium hydroxide; turns blue;	<b>2</b> 1 1
6(d)	sulfur dioxide produced / SO <sub>2</sub> formed; causes breathing difficulties / harmful to eyes / coughing / damages lungs / irritates eyes / sore throat / skin burns / difficulty swallowing / headache / vomiting;	<b>2</b> 1 1

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
7(a)	flask; (gas) syringe;	2 1 1
7(b)(i)	1.0 (mol/dm <sup>3</sup> ) because the initial gradient is steeper/initial slope is steeper;	1
7(b)(ii)	steeper gradient than curve for 1.0 mol/dm <sup>3</sup> ; same final volume;	2 1 1
7(c)	any suitable use, e.g. fuel/reducing agent/making margarine/making ammonia/Haber process/fuel cells;	1
7(d)	dust has a (very) high surface area;	1



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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
8(a)	<u>mixture</u> of 2 or more metals / <u>mixture</u> of a metal and a non-metal;	<b>1</b>
8(b)	any alloy, e.g. brass, bronze etc.;	<b>1</b>
8(c)	any 4 from: <ul style="list-style-type: none"> <li>• solder has melted;</li> <li>• atoms in solid (only) vibrate;</li> <li>• atoms in solid are regularly arranged / touching / close to each other;</li> <li>• atoms start to vibrate more;</li> <li>• atoms in liquid are irregularly arranged / close together / touching;</li> <li>• atoms in liquids slide over each other / atoms in liquids move slowly;</li> <li>• atoms move more during melting;</li> <li>• atoms become less regularly arranged during melting;</li> </ul>	<b>4</b>
8(d)	vapour <u>spreads</u> everywhere / vapour <u>does not stay in one place</u> ;	<b>1</b>